Week 3 Questions

1. Hyaline cartilage is found in all of these locations EXCEPT:
   1. Fetal skeleton
   2. Larynx
   3. Intervertebral disc
   4. Bronchi of the lungs
   5. Synovial joints
2. Which of the following is not a characteristic of cartilage:
   1. Avascular
   2. Large amount of ECM
   3. Large round cells, randomly scattered
   4. Surrounded by perichondrium
   5. Large amount of hyaluronic acid
3. A patient came into your clinic complaining of back pain and numbness in his toes. The resident, after completing a physical exam, suggested the man has a herniated disc in the lumbar region of his vertebral column. Using your knowledge about “slipped discs” you know the problem is due to:
   1. Extrusion of the annulus fibrosis
   2. Extrusion of type I collagen fibers
   3. Extrusion of nucleus pulposis
   4. Both A and C
   5. All of the above
   6. None of the above
4. Which of the following is not true regarding the repair of damaged articular cartilage:
   1. Must have continuous passive movement
   2. Fibrocartilage will replace the damaged cartilage
   3. Must punch through the calcified cartilage layer to allow chondroprogenitor cells to migrate into the area
   4. Damaged cartilage cannot undergo mitosis to regrow itself
5. All of the following are true regarding rheumatoid arthritis EXCEPT:
   1. Inflammatory disease
   2. Increased synovial fluid production
   3. Pannus tissue erodes away cartilage
   4. Autoantibodies against cartilage and synovial membrane
   5. None of the above
6. A diabetic comes into your clinic to get blood drawn to measure his blood glucose level. The lab results come back showing a large amount of Hb Aic. You remember Hb Aic is formed from glucose reacting non-enzymatically with hemoglobin in a two-step process, consisting of a reversible \_\_\_\_\_\_\_\_\_\_\_ followed by an irreversible \_\_\_\_\_\_\_\_\_\_\_.
   1. Amadori rearrangement, Schiff base reaction
   2. Mutarotation reaction, Schiff base reaction
   3. Schiff base reaction, Amadori rearrangement
   4. Amadori rearrangement, epimerization reaction
   5. Oxidation reaction, reduction reaction
7. All of the following are characteristics of fructose EXCEPT:
   1. Can be found in fruit juice or honey
   2. Is an aldose sugar
   3. Considered a hexose
   4. Exists as a furanose ring in the Haworth projection
8. Sucrose is composed of:
   1. α-glucose and β-fructose in a 1-2 linkage
   2. α-glucose and α-glucose in a 1-1 linkage
   3. β-galactose and β-glucose in a 1-4 linkage
   4. α-glucose and α-glucose in a 1-4 linkage
9. Which of the following are true about glycogen:
   1. Stored in the liver and muscle
   2. Consists of core protein called glycogenin
   3. Has a similar structure to amylopectin
   4. Both A and B
   5. All of the above
10. All of the following are characteristics of osteoclasts EXCEPT:
    1. Originate from granulocyte-macrophage progenitor cells
    2. Secrete alkaline phosphatase
    3. Sit in a resorption bay
    4. Have multiple nuclei
11. A patient comes into the hospital with a broken right ulna. While performing a patient history, you find out she is taking Coumadin for her congestive heart failure and also has several bone disorders. This is not uncommon because you remember Coumadin works by interfering with the carboxylation of glutamic acid, which can cause bone disorders by:
    1. Interfering with the synthesis of chondrocalcin
    2. Interfering with the synthesis of osteoblasts
    3. Interfering with the synthesis of osteoclasts
    4. Interfering with the synthesis of osteocalcin
    5. None of the above
12. Which of the following is true about Parathyroid hormone:
    1. Effect is to decrease blood calcium levels
    2. Has receptors on osteoblasts
    3. Effect is to decrease osteoblasts activity
    4. Both B and C
    5. All of the above
13. Which of the following are not true regarding the endosteum:
    1. Looks like simple cuboidal epithelium
    2. Part of the bone lining cell network
    3. Has osteogenic capabilities
    4. Single layer of cells
    5. All of the above
    6. None of the above
14. Sharpey’s fibers:
    1. Consist of elastic fibers extending in from the periosteum
    2. Are seen wherever synovial joints are found
    3. Are adhesion fibers that contain many sulfated GAGs
    4. Are only found in the fetal skeleton
    5. None of the above
15. Which of the following hold myofibrils in their precise alignment:
    1. Desmin
    2. Villin
    3. Vimentin
    4. Dystrophin
    5. A, C, and D
    6. All of the above
16. All of the following are characteristics of skeletal muscle EXCEPT:
    1. Multiple nuclei at the periphery
    2. Capable of mitotic regeneration
    3. Under voluntary control
    4. Have characteristic sarcomeres
    5. None of the above
17. Choose the correct statement about skeletal muscle:
    1. During muscle contraction, only the A-band shortens
    2. At the LM level, the H-zone appears light staining in the center of the A-band
    3. Titan anchors the actin thin filaments to the z-line
    4. Troponin C binds to the tropomyosin strand
    5. None of the above
18. Choose the correct statement about T-tubules:
    1. They form a “diad” with the terminal cisternae of the SR
    2. They allow for a more uniform and rapid depolarization of the sarcolemma
    3. They invaginate at the A/I junction
    4. Both B and C
    5. All of the above
19. A 45 year old patient comes into the hospital complaining of flu-like symptoms. His very short stature is consistent with dwarfism. You remember a number of substances can cause dwarfism if the incorrect amount is received. Which of the following can cause dwarfism:
    1. An excess of GH as a child
    2. An excess of vitamin A
    3. A deficiency of GH as a child
    4. Both B and C
    5. None of the above
20. Choose the correct statement about growth at the epiphyseal plate:
    1. There are four zones describing endochondral ossification
    2. Once closure occurs, it is normal to see an epiphyseal line on an X-ray
    3. The bone deposited during the zone of ossification is lamellar bone
    4. The zone of proliferation contains rapid proliferation of osteoblasts
    5. The net effect is an increase in the width of the bone
21. All of the following are correct in the modeling of long bones EXCEPT
    1. They increase in diameter by intramembranous ossification
    2. At the top of the cone, osteoblasts deposit bone on the inside
    3. At the bottom of the cone, osteoclasts remove bone from the outside
    4. At the top of the cone, osteoclasts remove bone from the outside
    5. All of the above
22. Choose the correct statement about fracture repair:
    1. Both endochondral and intramembranous ossification occur
    2. During early repair, granulation tissue forms around the ends of the broken fragments
    3. It takes 10-12 weeks for good bony union to occur
    4. Woven bone is laid done first
    5. Both A and D
23. Which of the following is a correct series of steps in endochondral ossification in the development of the fetus? (some steps may be skipped)
    1. Hypertrophy of chondrocytes🡪bony trabeculae form 🡪 Periosteal buds enter and erode away uncalcified cartilage 🡪osteoprogenitor cells differentiate into osteoblasts🡪 calcification of bone osteoid occurs
    2. Chondrocytes hypertrophy and secrete alkaline phospatase🡪periosteal collar forms around midshaft🡪periosteal buds erode away uncalcified cartilage🡪osteoblasts lay down osteoid🡪 Calcification of osteoid occurs and bony trabeculae form
    3. Periosteal buds enter and erode away uncalcified cartilage 🡪 Calcification of osteoid occurs and bony trabeculae form🡪chondrocytes hypertrophy and secrete alkaline phosphatase🡪 osteoprogenitor cells differentiate into osteoclasts 🡪 Periosteal collar forms around the epiphysis
    4. Chondrocytes hypertrophy and secrete carbonic anhydrase 🡪 periosteal collar forms around midshaft 🡪 osteoclasts lay down osteoid 🡪 periosteal buds erode away calcified cartilage 🡪 Calcification of osteoid occurs and bony trabeculae form
24. Choose the correct statement about Phosphofructokinase:
    1. It catalyzes the committed step in glycolysis
    2. It is stimulated by ATP, citrate, and long chain fatty acids
    3. It catalyzes a irreversible reaction
    4. Both A and C
    5. All of the above
25. All of the following are true of the reaction of pyruvate 🡪 lactate EXCEPT:
    1. It is a reversible reaction catalyzed by lactate dehydrogenase
    2. The reaction is inhibited by F 1,3 bisphosphate and citrate
    3. It is anaerobic glycolysis which is the main source of energy in red blood cells
    4. It regenerates NAD+ allowing glycolysis to continue in the absence of oxygen
    5. None of the above
26. Which of the following are true regarding the malate aspartate shuttle:
    1. It is located in skeletal muscle and adipose tissue
    2. It gives rise to 1.5 ATP molecules
    3. It shuttles H+ only from the cytoplasm to the mitochondria
    4. All of the above
    5. None of the above
27. Choose the correct statement
    1. 30-32 moles of ATP are generated in the oxidation of glucose in aerobic glycolysis
    2. 2 moles of ATP are generated in aerobic glycolysis
    3. 2 moles of NADH are produced going from glucose to pyruvate in aerobic conditions
    4. 0 moles of NADH are produced going from glucose to lactate in anaerobic conditions
    5. A, C, and D
    6. All of the above

Answers on next page

* + - 1. C 11. D 21. C
      2. E 12. D 22. E
      3. C 13. A 23. B
      4. C 14. D 24. D
      5. E 15. E 25. B
      6. C 16. B 26. E
      7. B 17. E 27. E
      8. A 18. D
      9. E 19. D
      10. B 20. B